

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

July 9, 2007 (9:51am)

OFFICE OF SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

In the matter of  
Entergy Corporation  
Pilgrim Nuclear Power Station  
License Renewal Application

Docket # 50-293

July 9, 2007

**PILGRIM WATCH'S ANSWER TO NRC STAFF RESPONSE TO ENTERGY'S  
MOTION FOR SUMMARY DISPOSITION OF PILGRIM WATCH  
CONTENTION 3**

**INTRODUCTION**

On June 29, 2007, NRC Staff filed a response in support of Entergy's Motion for Summary Disposition of Pilgrim Watch's Contention 3. On July 2, 2007 NRC Staff filed a Motion for Leave to File Response to Entergy's Motion for Summary Disposition Out of Time.

Pilgrim Watch under 10 CFR 2.710(a) responds; and for reasons stated below finds that no new facts or responses were provided by NRC Staff to justify granting Entergy's motion; the NRC Staff response largely summarize points made by Entergy.

Most important NRC Staff and their consultants Joseph Jones and Nathan Bixler, like Entergy, failed to address the fundamental issues under dispute; and do not properly analyze what their improperly limited approach admits to be issues for consideration.

Fundamentally, the Staff never defines or considers:

- What are the parameters, consequences and duration of a "severe accident;"
- The actual meteorology in the area affected by PNPS;

- The evacuation delay time and time estimates considered are in too narrow a geographic area; they ignore the reality of how people actually behave in a disaster and how the wind blows in this coastal area carrying the plume in a variable manner;
- The economic consequences examined underestimate or ignore important inputs and enter that data into an inappropriate model.

A SAMA analysis, by definition, is intended to determine what steps should be taken to mitigate the potential effects of a “severe accident.” But nowhere does the NRC Staff, or Entergy, define what a “severe accident” is. A “severe accident” is not necessarily “worst case,” but neither is it limited to an accident of limited release and duration that appears to be their working assumption. Logically there should be separate SAMA analyses for each level of accident release and duration – from mild to severe. Averaging masks impact.

The Staff’s and Entergy’s evacuation and economic analysis is based on their incorrect assumption that only a small portion of those within the 10 mile EPZ will evacuate or be economically affected and no impact of any significance is assumed beyond the EPZ. Their justification for the straight-line Gaussian plume model is based on a study in Kansas/Oklahoma which explicitly said that they did not choose a site that met the following criteria, “a site with changes in surface properties that could affect the local flow, such as a coastal site with land-sea breeze.”

The Staff’s and Entergy’s reliance on an incorrect straight-line Gaussian plume model is further complicated by their misrepresentation of the sea breeze. A sea breeze near PNPS will concentrate, rather than disperse, a radioactive plume; and carry the plume inland 15 km before bringing it back over the land mass out again to sea. When the water/land temperature differential is such not to develop a sea breeze, an-over water plume does not rapidly disperse, but remains tightly concentrated over the water until winds blow it back to shore in a concentrated form perhaps to more densely populated Boston, towns/cities along the coast from Plymouth north 50 miles or to communities on Cape Cod.

The reasons set forth in Pilgrim Watch's Answer Opposing Entergy's Motion for Summary Disposition of Pilgrim Watch Contention 1, June 27, 2007 demonstrated that Entergy failed to show that a material dispute has ceased to exist or has been resolved since the Board's review of Pilgrim Watch's initial contention 3 and the Board's order of October 16, 2006 confirming existence of material dispute regarding Contention 3. Nothing in NRC Staff's response or the accompanying affidavit leads to a different conclusion. Genuine issues of material fact remain that warrant a hearing.

## DISCUSSION

### 1. Legal standards Governing Motions for Summary Disposition – Pilgrim Watch

a. Under the Rules of Practice, 10 CFR Part 2, a motion for summary disposition should be granted if the Licensing Board determines, with respect to the question at issue, that there is no genuine issue as to any material fact and that the moving party is entitled to a decision as a matter of law. 10 CFR § 2.749(d).

b. Under the concept of summary disposition (or summary judgment), the motion is granted only where the movant is entitled to judgment as a matter of law, where it is quite clear what the truth is and where there is no genuine issue of material fact that remains for trial. [Tennessee Valley Authority (Browns Ferry Nuclear Plant, Units 1, 2 & 3), LBP-73-29, 6 AEC 682, 688 (1973); Private Fuel Storage. L.L.C., LBP-99-23, 49 NRC 485, 491 (1999); Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant), CLI-00-1 1, 53 NRC 370,384 (2001).

c. Summary disposition is a useful tool for resolving contentions that, after discovery is completed are shown by undisputed facts to have nothing to commend them, but it is not a tool for trying to convince a Licensing Board to decide genuine issues of material fact that warrant resolution at a hearing. Private Fuel Storage. L.L.C. (Independent Spent Fuel Storage Installation), LBP-01-39, 54 NRC 497,509 (2001).

d. Once an applicant has submitted a motion that makes a proper showing for summary disposition, the litmus test of whether or not to grant the summary disposition motion is whether the Intervenor has presented a genuine issue as to any material fact that is relevant to its allegation that could lead to some form of relief. Georgia Power Company (Vogtle Electric Generating Plant, Units I and 2) LBP-94-37,40 NRC 288 (1994).

e. If there is any possibility that a litigable issue of fact exists or any doubt as to whether the parties should have been permitted or required to proceed further, the motion must be denied. General Electric Co. (GE Morris Operation Spent Fuel Storage Facility), LBP-82-14, 15 NRC 530, 532 (1982); Safety Light Corn. (Bloomsburg Site Decommissioning and License Renewal Denials), LBP-95-9,41 NRC 412,449 n.167) citing Anderson v. Liberty Lobby. Inc., 477 U.S. 242, 248 (1986).

f. The party seeking summary judgment has the burden to show the absence of a genuine issue as to any material fact. Evidence must be reviewed in the light most favorable to the party opposing summary judgment. Advanced Medical Systems. Inc. (One Factory Row, Geneva, Ohio 44041), CLI-93-22, 38 NRC 98, 102 (1993); Dr. James E. Bauer (Order Prohibiting Involvement in NRC Licensed Activities), LBP-95-7, 41 NRC 323,329 (1995).

g. Based on judicial interpretations of Rule 56, the burden of proof with respect to summary disposition is upon the Movant who must demonstrate the absence of any genuine issue of material fact. Private Fuel Storage. L.L.C.(Independent Spent Fuel Storage Installation), LBP-00-6,51 NRC 101, 112 (2000).

h. The Board's function, based on the filing and supporting material, is simply to determine whether genuine issues exist between the parties. It has no role to decide or resolve such issues at this stage of the proceeding. The parties opposing such motions may not rest on mere allegations or denials, and facts not controverted are deemed to be admitted. Since the burden of proof is on the proponent of the motion, the evidence submitted must be construed in favor of the party in opposition thereto, who receives the benefit of any favorable inferences that can be drawn. Sequoyah Fuels Corp. and General

Atomics (Gore, Oklahoma Site Decontamination and Decommissioning Funding), LBP-94-17, 39 NRC 359,361 (1994).

i. Commission decisions affirm that a summary disposition opponent is entitled to the favorable inferences that may be drawn from any evidence submitted. See Sequoyah Fuels Corp. (Gore, Oklahoma Site Decontamination and Decommissioning Funding), LBP-94-17, 39 NRC 359,361, affd, CLI-94-11,40 NRC 55 (1994). This authority, however, does not relieve the opposing party from the responsibility, in the face of well pled undisputed material facts, of providing something more than suspicions or bald assertions as the basis for any purported material factual disputes. Private Fuel Storage. L.L.C., LBP- 99-35, 50 NRC 180, 194 (1999).

j. If it appears from the affidavits of a party opposing the motion for summary disposition that the party cannot for reasons stated present by affidavit facts essential to justify the party's opposition, the Board may refuse the application for summary disposition or may order a continuance as may be necessary or just. See Rule 56(t) of the Federal Rules of Civil Procedure.

## **2. NRC Staff's Review of Legal standards Governing Motions for Summary Disposition**

NRC Staff stated that a moving party is entitled to summary disposition of a contention as a matter of law if the filings in the proceeding, together with statements of the parties and the affidavits, demonstrate that there is no genuine dispute as to any material fact [NRC Staff at 3].

Entergy set forth 58 Material facts. Pilgrim Watch disputed all 58.

NRC Staff said that a party opposing a motion for summary disposition cannot rely on mere allegations or denials of the moving party's facts; rather, the non-moving party must set forth specific facts demonstrating a genuine issue of material facts [NRC Staff at 3]. Pilgrim Watch's answer to Entergy's Motion set forth specific facts disputing Entergy's material facts; and supported Pilgrim Watch's dispute with declarations provided by the

following experts. Meteorology: Jan Beyea, PhD., a nuclear physicist and regular member of panels and boards of the National Research Council of the National Academy of Sciences and an advisor to the Division of Engineering and Physical Sciences, formerly a Senior Policy Scientist, Chief Scientist and Vice President of the National Audubon Society, and currently senior scientist at Consulting in the Public Interest, Princeton; Bruce Egan, ScD., CCM., CCM; air quality consultant; Richard Rothstein, CCM, QEP.; Nancy Oates, Duxbury, Town Clerk, Annual Town Meeting 2007, vote. Emergency Planning: Andre Martecchini, Chairman Board of Selectmen, Town of Duxbury; Representative Matthew Patrick, State Representative, Third Barnstable; Donald Zeigler, PhD., Professor of Geography, Old Dominion University Economics: David Chanin, coded MACCS2 Model; Richard Finnegan, Assessor, Town of Duxbury, Timothy Warren Jr., Chief Executive Officer the Warren Group. PW in addition referenced pertinent NRC regulations and guidance; KLD Evacuation Time Estimates; and a host of other sources providing specific facts demonstrating a genuine issue of material facts.

In contrast neither Entergy nor NRC Staff demonstrated that there is not a genuine dispute on the fundamental issues-models and assumptions that are at the very base of the dispute. Both simply deal with an improperly limited scope on secondary issues avoiding the key points in dispute. The secondary issues that they use to support their position flow from erroneous primary assumptions and models and thereby lead to incorrect conclusions. For example the main dispute is not whether evacuation time is a half-hour or hour longer or shorter or traffic speed of 1.54 mph instead of 2.17 mph; the dispute is whether Entergy and NRC Staff addressed, for example: a variable trajectory plume so that more people than those simply within a narrow key-hole would be required to and choose to evacuate; defined a "severe accident" as one that has releases greater than would occur in a "best case scenario;" considered a shadow evacuation outside the 10-mile emergency planning zone; and "voluntary evacuation" of the majority inside the emergency planning zone; and estimated traffic times during peak traffic periods – holidays, computer hours, morning week-end summer traffic.

The facts provided by Pilgrim Watch in response to the motion indicate that there is ample reason to hold a hearing to address these very basic, key issues – to widen the lens and consider issues of fundamental importance – to rise above the noise level.

**2A. NRC Staff submits that Contention (3) in essence is a contention of omission.**

NRC mischaracterizes Contention 3. At 5, NRC states that, “Contention 3 has essentially two parts: First that certain information was omitted from the SAMA analysis, and as a result, the conclusions of the SAMA analysis are incorrect; and second, that if the information is considered, the results will change.” NRC goes on to incorrectly conclude that, “The Staff submits that the information Pilgrim Watch sought to have considered in Entergy’s SAMA analysis has now been considered, as demonstrated by the additional information supplied by Entergy, thus rendering the first part of the contention moot. Further, Entergy has demonstrated that the additional factors considered do not change the conclusions of the SAMA analysis. Thus, if Pilgrim Watch cannot demonstrate that the conclusions reached using the information are incorrect, then the motion for summary disposition should be granted.”

NRC is incorrect on both counts.

**1) The fundamental issues in dispute were not considered by Entergy or NRC Staff; and even in their improperly limited view they both failed to accurately address other issues. For example missing from the analysis are the following:**

**Meteorology**

Fundamental issues ignored

- a) Neither considered a variable trajectory plume distribution model – instead they used the straight-line Gaussian plume distribution model that is not appropriate for Pilgrim’s coastal location
- b) Neither defined nor justified precisely the parameters of a “severe accident” in terms of the amount and kind of radionuclides assumed released in their analysis – this is a

consequence analysis therefore it is appropriate to know how much Cs-137, for example, they assume is released and over what time period the releases occur.

- c) Neither party understood the sea breeze in Pilgrim's coastal community and its effect on increasing dose on communities inland to an approximate 15 km during warmer months – neither appreciated the role of terrain and other complexities in our meteorology
- d) Neither appreciated nor modeled the transport of a plume over water and the fact that a plume will remain tightly concentrated due to the lack of turbulence until winds blow puffs back to land that can lead to hot spots of radioactivity in places along the coast certainly to Boston and to communities on Cape Cod.
- e) Neither modeled the effect of deposition on site and its re-suspension onto nearby communities

### **Evacuation Delay**

#### Fundamental issues ignored

- f) Neither considered the variable trajectory plume model and its application to evacuation – if they had they would have properly rejected the assumption that only those within a straight-line key-hole need to be evacuated or will, in fact, self evacuate – the key hole theory has no place in our coastal location
- g) Neither modeled or assumed in assessing evacuation time estimates a greater quantity of radioactive release that normally is associated with the term “severe accident”
- h) Both claim that emergency planning makes no difference – they denied the importance of consequences on those citizens inside the emergency planning zone communities – both subscribed to the concept that even if no evacuation or sheltering occurred the SAMA analysis would not be effected because the impact on distant heavily populated communities is what mattered [Entergy Material fact 7, Jones at 15]. This concept is contradicted by NRC regulations and guidance that require emergency planning in the EPZ in order for a reactor to operate. Entergy projected the 2032 EPZ population to be 165,236. For perspective compare that population at risk to the approximate number who died in the 9/11 attacks, 3,000; and to US Military casualties to date in Iraq, 3606, and last to US military wounded, 25,830.

### Issues misrepresented or ignored in Entergy's and NRC Staff's limited analysis

- i) Neither party recognized that evacuation delay time will be increased because sirens cannot be heard above normal ambient noise by those working or sleeping inside and that the backup system [route notification] is equally ineffective – it calls for local emergency workers to travel over the hundreds of miles of roads to notify citizens by bullhorns – unlikely to be heard inside, also
- j) Neither recognized that an evacuation is not complete once citizens cross the 10-mile boundary line – radiation does not blow off bodies and vehicles once they cross over the line and federal regulation [NUREG 0654, J-12] recognizes this by requiring that all citizens within the 10-mile EPZ are monitored for contamination within 12 hours at the Reception Centers – located 20-30 miles away – how long is it estimated to take to “process” the EPZ population through the reception centers?
- k) Neither modeled the shadow evacuation effects on traffic times
- l) Neither included peak traffic times in estimating evacuation speed
- m) Neither looked at evacuation scenarios other than those that occur only under the “best case” scenario – neither considered lessons learned from Katrina such as vehicles running out of gas – no evidence was provided that there is advance planning in place for providing supplemental gasoline trucks along major evacuation routes or concrete plans in place for reverse lanes –both will affect evacuation times
- n) Neither backed up time estimates for transporting the transportation dependent by providing Letters of Agreement, Transportation Matrixes and methods available to contact drivers who are off-duty
- o) Neither modeled consequence for those who can not evacuate and must shelter by consideration of dose reduction capability of buildings – such as nursing homes and hospitals for patients who cannot be transferred

### **Economic Consequences**

#### Fundamental issues ignored

- p) Both relied upon and supported using the MACCS2 Model - it is not an inappropriate tool to assess economic consequences, as explained by David Chanin who coded the model

Issues misrepresented or ignored in Entergy's and NRC Staff's improperly restricted view

- q) Both underestimated costs – such as the value of farm and non-farm property, interdiction costs, health costs due to cancer; and underestimated interdiction by not considering the specific characteristics of Pilgrim's coastal community that increase the difficulty, and in some cases impossibility, of decontamination. This is an increasingly urbanized area; buildings are largely made of wood, concrete and brick – rough surfaces difficult to clean; rain and moisture make decontamination difficult.
- r) Both failed to consider all costs, costs ignored included, for example health costs other than cancer mortality, job retraining, unemployment payments, litigation, and “good will” aspect business. Their largest omission is their assumption that damage will occur only from a relatively minor accident and its impact will be only to those along a straight line plume distribution model

**2B. NRC Staff incorrectly state at 6 that, “Entergy has demonstrated that the additional factors considered do not change the conclusions of the SAMA analysis.”** Technically this is true but the point is that they did not consider the fundamental issues that they should have and those that they considered in their limited view they failed to properly address. A faulty and incomplete analysis yielded a faulty conclusion.

**2C. NRC concludes that, “Thus, if Pilgrim Watch cannot demonstrate that the conclusions reached using the information are incorrect, then the motion for summary disposition should be granted.”** Pilgrim Watch's job is to demonstrate that the inputs used do not reflect the conditions at issue. We have discussed and backed up with expert references the inputs that should be used to provide an honest analysis. The ASLB Order, October 2006 clearly stated that, “the focus of the contention, and that part that we admit, is on what input data should be utilized in the SAMA analysis with regard to evacuation times, economic realities, and meteorological patterns, and whether the input data used by the Applicant accurately reflect the respective conditions at issue.”

Pilgrim Watch has demonstrated that indeed there remains a genuine dispute because the information that Pilgrim Watch sought to have considered was ignored. These are the basic factual questions appropriate for resolution in litigation of this contention; otherwise there will not be the 'hard look' required by NEPA.

Pilgrim Watch calls for "further analysis" by directly addressing these key assumptions and models; and this is a "valid and meaningful remedy" to call for under NEPA, given that, "[w]hile NEPA does not require agencies to select particular options, it is intended to 'foster both informed decision-making and informed public participation, and thus to ensure the agency does not act on incomplete information, only to regret its decision after it is too late to correct.'"<sup>1</sup>

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<sup>1</sup> *McGuire*, CLI-02-17, 56 NRC at 10).

## AFFIDAVIT OF JONES AND BIXLER

Each "Statement of Material Fact" assembled by Joseph Jones and Nathan Bixler is reproduced below, followed by Pilgrim Watch's answer. Their statements refer to Entergy's material facts and they essentially raise the same points as Entergy. For convenience Pilgrim Watch will reproduce our previous response to the particular Entergy Material Fact that Jones and Bixler reference. Where Jones or Bixler add something new, Pilgrim Watch will respond. Because Jones and Bixler essentially repeat what Entergy had to say, Pilgrim Watch incorporates all comments, declarations and analyses provided in our reply to Entergy's Motion for Summary Disposition.

### Meteorology

7. *(NEB) Material fact number 10 states that it is impracticable to use computer codes that accommodate multi-station data. The effort needed to perform a multi-weather station consequence analysis is significantly greater than the effort required to perform a similar analysis with MACCS2. But, such multi-station analyses have been and continue to be performed in support of Final Safety Analysis Report (FSAR) documentation for space launches that involve significant quantities of radioactive materials. I agree, however, that multi-station analyses are beyond what is needed to support the Pilgrim SAMA process. The MACCS2 Gaussian plume model is generally in agreement with more sophisticated codes for distances such as between the site boundary and 50 miles.<sup>2</sup> Therefore, in my judgment, use of a multi-weather station analysis would not change the conclusions of the SAMA analysis.*

PW Response– Dispute: Note that there are (2) parts to this NEB's response.

A. *NEB "That it is impracticable to use computer codes that accommodate multi-station data:*

PW Entergy Material Fact 10 - Dispute: (i) There are appropriate complex models today that have the same kinds of meteorology/dispersion modeling attributes with respect to

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<sup>2</sup> See NUREG/CR 6853, "Comparison of Average Transport and Dispersion Among a Gaussian, a Two-Dimensional and a Three-Dimensional Model," (Oct.2004).

assessing variable trajectory wind flows and can be adapted for use at nuclear power plants. Today they can be applied more readily and cost-effectively in a PC environment as compared to the cumbersome modeling systems that were only available 25 years ago. [Beyea at 12; Egan at 8 and 11, Rothstein at 01/26/07 email to R. Emch, NRC and 04/24/06 communication to J. Berger, at 2]. ii) Dr. Bruce Egan at 13, Item 15,

“With the rapid advancement of computers and software in the past decade, computational time should not be a major factor in the choice of a dispersion model used for non real time applications. My experience is that most dispersion model runs require that multiple years of hour by hour meteorological data be used, that computations offer hundreds of receptors locations be made and that source inventories sometimes include hundreds to thousands of sources which may have to be broken down to even larger numbers of individual point or area type sources for computational reasons. Many models also use multiple runs using ‘bootstrap’ techniques to generate statistical bounds on the models predicted values. Other modeling groups have not found similar applications ‘simply impractical.’”

B) *The MACCS2 Gaussian plume model is generally in agreement with more sophisticated codes:*

PW Dispute: Discussed at 8, below.

8. *(NEB) Material fact number 12 states that the MACCS2 Gaussian plume model results are in good agreement with, and generally more conservative than those obtained by more sophisticated models. If the word conservative implies that calculated plumes with the MACCS2 code are generally more focused and more concentrated than would be the case if the calculations had been performed with more sophisticated models, then the statement is accurate. However, a more focused, more concentrated plume does not always correspond to a smaller number of person-rem, depending on the trajectory of the plume compared with population centers. On the other hand, economic consequences are generally smaller when plumes are broader and more dilute. Thus, in the context of*

*a SAMA analysis, the statement is reasonable.*

PW Response Entergy Material Fact 12 – Dispute: A) The MACCS2 Gaussian plume model results may be as stated, "... in good agreement with, and generally more conservative than, those obtained by more sophisticated models that address variable meteorological and terrain effects;" but, and this is the important point, those studies were not performed in coastal locations so that it is an irrelevant statement- an apples to oranges comparison.

PW adds in response to Bixler: Specifically, the study referenced NUREG/CR 6853, "Comparison of Average Transport and Dispersion Among a Gaussian, a Two-Dimensional and a Three Dimensional Model," (October 2004) states that, "The site chosen for the test was the Department of Energy's Atmospheric Program Southern Great Plains site in central Oklahoma and Kansas. The authors of the study point out at 3 that they *did not select a site* that met the following criteria, "a site with changes in surface properties that could affect the local flow, *such as a coastal site with a land-sea breeze.*" [Emphasis added]

B) Dr. Egan at 13,

"The fact that a model may seem conservative in particular applications or in limited data comparisons does not mean that the model is better or should be recommended for an application. Models can be conservative but have incorrect simulations of the underlying physics. Similarly, sensitivity studies do not add useful information if the primary model is flawed."

9. (NEB) *Material fact number 16 states that Sensitivity Case 2 estimated the effects of changing wind direction trajectory and was conservative because it used conditions at the beginning of a plume release, when the release has larger dose quantity and less decay has occurred. The MACCS2 value modified in Sensitivity Case 2 appears to have been REFTIM (Representative Time Point for Dispersion and Radioactive Decay). REFTIM affects the way in which dispersion, deposition, and radioactive decay are calculated. It does not affect the manner in which "wind direction trajectory" is calculated. This statement appears to be erroneous; however, within the context of the*

*observed Pilgrim weather data, changes in the wind trajectory would not be expected to change the results of the SAMA analysis.*

PW Response Entergy Material Fact 16 – Dispute: Pilgrim Watch has stated, and supported, the fact that the straight-line Gaussian Plume model is not appropriate for Pilgrim’s coastal location. Therefore the point raised by Entergy, that the input was conservative because it used conditions at the beginning of a plume release is totally irrelevant. We dispute Entergy’s claim that the “results show an increase in PDR and OECR of 3%” because the numbers resulted from using an inappropriate model. Again, as stated above by Dr. Egan, “Models can be conservative but have incorrect simulations of the underlying physics. Similarly, sensitivity studies do not add useful information if the primary model is flawed.”

PW Response to Bixler – Dispute: Jones/Bixler conclude that, “*changes in the wind trajectory would not be expected to change the results of the SAMA analysis.*” Nothing could be more off the mark; it reflects a lack of understanding of plume behavior in our coastal location. Jones/Bixler do not understand or do not want to recognize the need for a variable trajectory plume model at this site; the behavior of the sea breeze; nor the behavior of a plume over the water and the need to model its impact on Cape Cod and communities to the north of Pilgrim along the coast up to 50 miles, including Boston.

Richard Rothstein CCM, QEP, Plymouth Nuclear Matters Committee Report to the Plymouth Board of Selectmen, January 3, 2006 – Appendix A: Meteorology at 13, explains how weather conditions at this site as noted below can affect the plume trajectory in time and space that can increase the total frequency of occurrence of variable wind conditions over an annual basis. The important thing is having the ability to account for the plume not moving in a straight line, regardless of whether it is due to a summertime sea breeze or other affecting weather systems in the region at any time of the year. Current analyses provided by Entergy and NRC Staff do not have this capability.

“... the variable wind conditions over time and space, likely in this coastal, hilly terrain area, makes resultant predictions of the movement of lethal airborne materials based on just onsite meteorological data (with simplistic “straight-line” air quality dispersion models) *absolutely unreliable for evacuation planning purposes.*

On the one hand, during moderate to strong wind conditions such as those associated with coastal storms, approaching warm fronts, or after the passage of cold fronts, the wind direction throughout the region should be fairly uniform as would be depicted from one or more meteorological towers, e.g. the one at Plymouth Airport or at the Pilgrim Plant site. *However, abrupt wind shifts and wind speed changes can occur during the passage of such large-scale (“synoptic scale” in meteorological terms) weather systems throughout the region.* When wind speeds start to get lighter (e.g., below 5-10 mph), and depending upon the time of day and season, the terrain will also affect regional wind patterns in a more pronounced manner. During the spring and summer months whenever day-to-day large-scale regional weather influences are absent (storms and fronts), strong temperature contrasts between the warmer land and colder Cape Cod Bay can result in sea breeze conditions on sunny, fair weather days. At times sea breeze influences can penetrate miles inland. Weaker land breezes can also occur during other times, particularly at night, when the land surface is colder than the water body surface. Shifting wind patterns (including temporary stagnations, recirculations, and wind flow reversals) can occur during these daily sea and land breeze conditions, and can persist for several hours.

The exact *frequency of occurrence of variable wind conditions* including abrupt wind shifts that are associated with either large-scale weather systems, or more localized regional weather patterns (e.g., sea breezes), and their associated causes from year to year would require a detailed meteorological investigation of collected weather records over a multi-year period (also from a statistical standpoint).”

10. (NEB) *Material fact number 19 states that the effect of sea breeze is taken into account in the Pilgrim site meteorological data. Although the wind speed and direction of a sea breeze may be included in the actual PNPS meteorological data, the effect of sea breeze is not taken into account. The effect that is not taken into account is that the complex flow pattern under sea breeze conditions differs substantially from the straight-line pattern used in the MACCS2 analyses. The sea breeze occurrences are typically diurnal events, occurring during daylight hours and during warmer seasons. Thus they occur a small percentage of the total weather time assessed. The effects are averaged out in the MACCS2 analysis for the annual period assessed. The sea breeze effect was discussed in detail in the WSMS report. Except as noted here and in paragraph 11 of this affidavit, I agree with the analysis and with the conclusion in the WSMS report that sea breeze would not have an effect that would change the conclusions to the SAMA analysis.*

PW Response – Entergy Material Fact 19- Dispute: Pilgrim Watch acknowledges that Entergy may have taken sea breeze data into account *onsite*. They state, “The meteorological data gathered at the Pilgrim site and used in the SAMA analysis would reflect the occurrence of sea breeze conditions in terms of both speed and direction *at the Pilgrim site*” [emphasis added]. The problem, explained by Pilgrim Watch’s expert declarations, is that the model does not explain what happens when the sea breeze goes offsite. [Beyea, Egan, Rothstein Decls]

PW Response to Bixler – Dispute: A) NEB agrees with PW that Entergy did not take into account the offsite effect of sea breeze. B) PW parts company with NEB in his conclusion that because the sea breeze takes place usually only in the spring and summer that the effects are averaged out and therefore sea breeze would not have an effect on the conclusions of the SAMA analysis. NEB underestimates the effect of sea breeze because they apparently do not understand the sea breeze effect in our coastal communities. Site specific studies show that the sea breeze impacts seven communities surrounding Pilgrim and that the sea breeze does not move in a straight line – the plume will travel in a variable trajectory inland about 15 km. The potential importance of the impact of sea breeze on a SAMA analysis can not be dismissed because these communities will be

exposed to the highest concentrations of contaminants in a severe accident and these very communities are projected to become more densely populated during the re-licensed period, 2012-2032. By 2032, PW added to Entergy's projected population in the 0-10 miles to include Plympton and approximated 170,000.

*11. (NEB) Material fact number 21 states that any adverse effect of sea breeze conditions would only likely affect populations that are relatively close to PNPS (within about one mile). It appears that this statement may be taken out of context from the WSMS analysis. In reviewing the WSMA analysis, I only found one reference to a one-mile distance, and that was with respect to the fumigation effect of a sea breeze. I agree that fumigation occurs more locally – within the general distance of one mile. I also agree that any adverse impact of sea breeze would only likely affect populations that are relatively close to Pilgrim; however, it is difficult to quantify the distance of about one mile as indicated in material fact number 21. A greater distance is possible, but as indicated above, it is not likely that a sea breeze would persist long enough to reach the Boston area.*

PW Response – Entergy Material Fact 21- Dispute: A) Again referring to the Spengler study cited above in response to Material Fact # 20, depending on topography, intensity of solar heating and pressure gradients, a sea breeze front can penetrate inland from 1 km to 15 km. In fact, this is the reason epidemiology studies of health effects and emissions from PNPS include the Towns of Plymouth, Carver, Plympton, Kingston, Duxbury, Marshfield and Pembroke [PW Motion to Intervene 5.3.3]. The sea breeze can occur throughout the year but it occurs most frequently during the spring and summer months. On average Pilgrim experiences about 45 sea breeze days during these two seasons. Typically the onshore component commences about 10:00 AM and can persist to about 4 PM. The wind direction changes during the day veering from the north around through the southeast quadrant by late afternoon. The intensity of the sea breeze can be measured by the wind speed and distance of inland penetration. The intensity of the sea breeze circulation depends upon solar radiation heating of the land surfaces (which are

influenced by cloud cover), sea water temperature, and the strength of the gradient wind flow. B) Please refer to Egan comment above to Material Fact 20.

B) Dr. Egan at 13, Item 20 – clarifies NEB’s misconceptions at 10 and 11.

“There are several misleading statements in this statement. First, the statement that the meteorological data collected at the PNPS site would reflect the occurrence of the sea breeze in terms of wind speeds and directions is not necessarily true. As described earlier, the sea breeze is highly temporally and spatially dependent. A measurement at a single station will not provide sufficient information to allow one to project how an accidental release of a hazardous material would travel. One needs supplemental information, preferably in terms of additional meteorological stations. For example, a wind sensor located low along the coastline could provide an early warning of the onset of a sea breeze. Another met station further inland could confirm the strength and direction of the sea breeze event. More data would allow the implications of the sea breeze to be even better understood. Measurement data from one station will definitely not suffice to define the sea breeze. Secondly, the contention that the sea breeze is “generally beneficial” in dispersing the plume and in decreasing doses is incorrect. If a sea breeze were to not develop under conditions that they normally would develop, the air flow at the PNPS would be offshore, over the ocean, and be much more beneficial to the adjacent shoreline communities. It is in fact the presence of a sea breeze flow that would transport a release inland that is the greatest danger. Thus contrary to the implications of this declaration, the development of a sea breeze flow is the common meteorological condition that must be closely monitored at the PNPS. Thirdly this statement reflects a misconception that the sea breeze is generally a highly beneficial phenomenon that disperses and dilutes the plume concentration and thereby lowers the projected doses downwind from the release point.” If the same meteorological conditions that are conducive to the development of a sea breeze at a coastal site (strong solar insolation, low synoptic scale winds), were to occur at a non coastal site, vertical thermals would develop at somewhat random locations. To the extent that they develop over a pollution source, these thermals would carry

contaminants aloft and away from the population living at ground level. In contrast at a coastal site, the sea breeze would draw contaminants across the land and inland subjecting the population to potentially larger doses. These differences are important because they reveal a lack of appreciation of the importance of sea breeze flows on coastal community population exposures and on the need to obtain and properly use sufficient meteorological data in emergency response planning.”

PW Response to Bixler: A sea breeze would not affect Boston; however Jones/Bixler ignore the potential impact from a plume blowing out to sea and then affecting towns along the coast north of Plymouth including Boston and Cape Cod. Winds blowing offshore in the cooler months would likely carry a plume further into the 20 + mile region. This is because releases from Pilgrim headed initially out to sea will remain tightly concentrated due to reduced turbulence until the winds blow the puffs back over land [Zagar et al Angevine et al 2006]. This can lead to hot spots of radioactivity in unexpected locations [Angevine et al 2004]. Dismissing radioactivity blowing out to sea is inappropriate. Reduction of turbulence on transport from Pilgrim across the water to Boston and across to Cape Cod must be considered. Incorporating such meteorological understanding in the PSA or equivalent at Pilgrim could bring more SAMAs into play and would be significant in the absolute sense, when combined with the increase arising from the incorporation of new values of radiation dose conversion coefficients. The program CALPUFF [Scire et al 2000] has the capability to account for reduced turbulence over ocean water and could be used in sensitivity studies to see the importance of the phenomena is at Pilgrim. [The Massachusetts Attorney General’s Request for a Hearing and Petition for Leave to Intervene With respect to Entergy Nuclear Operations Inc.’s Application for Renewal of the Pilgrim Nuclear Power Plants Operating License and Petition for Backfit Order Requiring New Design features to Protect Against Spent Fuel Pool Accidents, Docket No. 50-293, May 26, 2006 includes a Report to The Massachusetts Attorney General On The Potential Consequences Of A Spent Fuel Pool Fire At The Pilgrim Or Vermont Yankee Nuclear Plant, Jan Beyea, PhD., Decl at 11-12; Egan Decl; Representative Patick Decl.]

## Evacuation Time Estimates

12. (NEB) *Material fact number 29 states that the MACCS2 models evacuation employing two parameters including evacuation delay time and evacuation speed. Technically, there are three parameters that affect the timing of evacuation: the delay to warning (OALARM), the delay to sheltering (DLTSHL), and the delay to evacuation (DTLEVA). However, since sheltering is not considered in the PNPS SAMA analyses (with the exception of one sensitivity case), the statement is correct as to the specific PNPS analyses.*

PW Response Entergy Material Fact 29 – Dispute: Pilgrim Watch understands that the MACCS2 models uses two parameters; however Pilgrim Watch denies that the inputs into those parameters were correct and that the assumptions behind the KLD Time Estimates relied upon by Entergy for evacuation time estimates are valid. [Please refer to the Pilgrim Watch’s discussion and Martecchini and Zeigler Decls].

PW response to Bixler: The affidavit brings up a good point that Emergency planning involves two protective action calls – evacuate and shelter. In NUREG-0654 FEMA-REP 1 Rev. 1 Supp.3, July 1996 -Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants they states at 3 that, “The staff has considered these uncertainties and has recognized that sheltering people in most structures close to a nuclear plant, where plume concentrations and dose consequences are likely to be highest, will not prevent early adverse health effects during a major radioactive release. Accordingly the staff has concluded that it is better to evacuate promptly near the plant for a serious reactor accident as a precautionary measure rather than to wait for additional information that may become available after a release occurs.” However Pilgrim Watch queries why sheltering is not being considered in the same context as evacuation time estimates. The dose reduction capabilities of public shelters in the emergency planning zone and areas such as Cape Cod would certainly have a bearing on severe accident consequences. Certainly those on Cape Cod have no option to evacuate and are at risk in a severe accident, see declaration Representative Matthew Patrick. The radiological Implementing Procedures for the EPZ

include sheltering, especially of vulnerable populations; and as stated above sheltering is one of the standard emergency protective action calls.

13. (NEB) *Material fact number 30 references the 10-mile EPZ. The material fact is correct in principal; however, the actual modeling performed for the SAMA, as reflected in the license renewal application, included evacuation of the population within 9 miles of the plant and did not include the full 10 mile EPZ. This approach was likely an error, and does present a conservative result because the individuals between 9 and 10 miles would receive a greater dose if they do not evacuate. This difference will not change the conclusions of the SAMA analysis.*

PW Response to Bixler: This is misleading because the KLD evacuation time estimates do not assume that everyone within 1-9 miles or within 1-10 miles will evacuate. Instead they assume that only those within a 2-mile ring around Pilgrim and those within a the key- hole from 2-5 miles will be instructed to evacuate; 50% of those outside the annular ring in the 2-5 miles region will “voluntarily” evacuate; and only 35% of those within the 5-10 mile area will “voluntarily” evacuate. They do not consider shadow evacuation of those outside the 10 miles; nor the reality that everyone who can evacuate inside the EPZ will try to do so.

14. (JAJ) *Material fact number 40 states that 1.54 mph was slower than any of the evacuation speeds derived from the 1998 and 2004 ETEs. This is in error as 1.54 mph equates to a 6 hour and 30 minute evacuation and there are longer evacuation times in both ETE studies. The 1998 ETE study includes a 6 hour, 50 minute time for the midweek, midday, snow condition and the 2004 ETE study identifies a 6 hour, 45 minute evacuation time under the same conditions. Both studies include longer times – up to 7 hours, 20 minutes, for evacuation of transit dependent individuals. Although the material fact is incorrect, sensitivity analyses have been provided (WSMS report) that demonstrate that the difference in speed would not change the conclusions of the SAMA analysis.*

PW response to Jones/Bixler: Their statement that, “*Although the material fact is incorrect, sensitivity analyses have been provided (WSMS report) that demonstrate that the difference in speed would not change the conclusions of the SAMA analysis*” is irrelevant. The fact that the conclusions did not change is due to their faulty analysis based upon the continued use of incorrect models, faulty assumptions and selective inputs.

15. (JAJ) *The WSMS analysis presents an itemized listing of ETE issues, provides supporting facts, and includes sensitivity analyses to demonstrate that changes in the ETE would not affect the conclusions of the SAMA analysis.<sup>3</sup> The WSMS analysis provides a detailed discussion that fully supports the conclusion that the ETE issues in Contention 3 would not change the conclusions of the SAMA analysis*

PW response to Jones: A) Jones and Bixler, join Entergy and WSMS, and incorrectly conclude that emergency planning makes no difference. They supported WSMS in their conclusion that, “*the ETE issues in Contention 3 would not change the conclusions of the SAMA analysis*” and in footnote 3 that, “*The sensitivity analyses included a case where everyone within the 10 mile EPZ shelters in place, and an analysis where no one shelters or evacuates, which would bound the July 4<sup>th</sup> scenario raised by Pilgrim Watch.*” It is surprising that NRC Staff would let this pass because the NRC has determined that in order for a power reactor to operate it must have emergency planning in place for the 10-mile emergency planning zone communities. Its importance has been decided. Therefore the position put forward is untenable demonstrating that the models, assumptions and inputs underlying that conclusion are faulty.

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<sup>3</sup> The sensitivity analyses included a case where everyone within the 10 mile EPZ shelters in place, and an analysis where no one shelters or evacuates, which would bound the July 4<sup>th</sup> scenario raised by Pilgrim Watch.

## Economic Costs

16. (NEB) Material fact number 46 states that the MACCS2 model accounts for losses associated with economic activity such as loss of income, loss of value of crops not grown and loss of use and return on property, including commercial and business property. Loss of business income is estimated during periods of interdiction through the expected rate of return parameter (DSRATE). Furthermore, the daily evacuation and relocation cost parameters (EVACST and RELCST) can include lost personal income. However, these losses do not apply to people relocated from property that has been condemned. For condemned property, the model simply accounts for the value of the condemned property and the cost to permanently relocate individuals from the condemned property. However, since most of the contaminated property is restored to use in the Pilgrim MACCS2 analyses, the effect of lost income from condemned property is likely to be small compared with the other costs and in my judgment would not change the conclusions of the SAMA analysis.

PW Response Entergy 46 – Dispute: The MACCS2 model provides a value for physical tangible assets. However the real value of a business or a farm entails more than that. The real value of business, its projected potential (multiplier), is perhaps 10 times the value of its annual goods and services, and includes the loss of its intangibles, e.g., good will, reputation, etc. For example: look at an Annual Report – assets/liabilities/net worth – net worth equals more than hard goods; it also includes “intangibles” or good will. The same analysis holds for a farm. Loss of trained workers is another “cost” ignored. Trained workers who are familiar with that particular business are assets to consider. Not all relevant parameters are entered into the applicant’s analysis.

PW Response Bixler: A) Bixler statement that they conclude that, “since most of the contaminated property is restored to use in the Pilgrim MACCS2 analyses, the effect of lost income from condemned property is likely to be small compared with the other costs and in my judgment would not change the conclusions of the SAMA analysis”

It is clear that Entergy considers a "severe accident" as not so severe in that most of the property is assumed to be restored for use. Pilgrim Watch hopes that the ASLB will require that: 1) Entergy and NRC Staff provide a precise definition of "severe accident" in terms of quantity/ kind of releases and duration of the accident – hours, days; and provide a rationale for that choice. 2) Pilgrim Watch contends that a SAMA analysis should include separate analyses for the range of severe accident release scenarios, from mild to very severe – simply choosing a minor accident or taking an average from possible scenarios obscures what may occur and artificially throws the balance to costs in their cost/benefit analysis. B) Pilgrim Watch also contends that Entergy and NRC are overoptimistic on the likelihood of decontamination in a severe accident. The specific characteristics of Pilgrim's coastal communities were not taken into consideration. Coastal regions and wetlands have unique characteristics that can have a great impact on costs, principally, the difficulty of conducting ecological restoration. The disaster at Chernobyl provided important lessons in decontamination, evening cleaning up areas in more distant locations in Europe affected by the accident; however they are not incorporated in the model. After Chernobyl, it became widely recognized that the decontamination of urbanized areas could be exceedingly difficult. Southeastern Massachusetts is no longer sparsely populated and projected to become increasingly urbanized. For example, the following observations are found in European literature. Porous surfaces are much more difficult to decontaminate than smooth surfaces; our buildings are made of wood, brick, and concrete surfaces. Material deposited by rain is much more difficult to remove than material under dry conditions. This is a moist coastal area with abundant bogs and wetlands. And as the time lapse increases from deposition to decontamination, decontamination is rendered less effective. The speed at which New Orleans and coastal Louisiana have not been cleaned up is instructive. Example: Roed and Sandalls (1990) reported on the effectiveness of residential decontamination in Gayle Sweden, which was contaminated by a heavy rain deposit from Chernobyl fallout. For wet deposition, they found that gardens could be decontaminated to a DF of two by removing the soil, but, aside from windows, which were easily decontaminated, no more than 18% of the contaminants could be removed from the other components of residential property

[SAND96-0957, Appendix E at 11]. C). Bixler explain that for condemned property, the model simply accounts for the value of the condemned property and the cost to permanently relocate individuals from the condemned property. However this would underestimate damages. For example, if the property is a business or farm the value includes their reputation and good will and trained workers – far more than the value simply of the real estate.

17. (NEB) *Material fact number 47 states that that the SAMA analysis for PNPS allows for a return of 12% on the actual fair market value of all business property, including land, buildings, equipment and inventory and as such does account for loss of economic activity. Again, this statement is true for land that is interdicted and returned to use. It does not apply to land that is condemned. However, the Pilgrim MACCS2 analysis results show that most land is restored to use and not condemned; thus, this statement is true in context.*

PW Response Entergy Material Fact 47 – Dispute: The SAMA analysis allows for a return of 12% on fair market value of all business property; but as such we dispute that it accounts for loss of economic activity. A) Is 12% compounded over the re-licensed period? We feel that it should. B) No details are provided regarding how this number was reached. C) Property, for example, in Duxbury has increased about 10% a year. Therefore it seems reasonable that there would be an appreciation at 10% a year out to 30 years, or whatever time frame the clean-up period spans. Also looking at Annual Financial Reports, GE, for example, had a rate of return of 28%, 2006; Analog, located in Norwood MA, had a rate of return of 98%, 2006. The applicant fails to justify 12%.

O’Kula at 36-37 justifies the SAMA’s analysis use of a depreciation rate of 20%. Most real properties appreciate, not depreciate. Looking at property sales in Plymouth, for example, from 1988-2006 over a 20 year period shows a rate of increase of 150% - not a decrease. As far as equipment etc: on average equipment is expected to last longer than 5 years – a straight-line depreciation would result in \$0 value in 5 years. We contend that

the focus should be is on the public's interest; therefore a fair depreciation rate should be the cost of replacement.

PW Response Bixler: same as to number 16

*18. (NEB) Material fact number 49 states that no other code exists that performs similar analyses for severe accidents at nuclear power plants. There is at least one other code that is similar to MACCS2, and that code is COSYMA. However, COSYMA is no longer supported and has probably fallen into disuse. There are other codes for computing consequences, but these codes have significant limitations and differences, such as they can only model single weather scenarios or they do not have economic analyses capabilities. Thus, the statement is correct in context as the MACCS2 code is the current standard for performing SAMA analyses.*

PW Response Entergy Material Fact 49 – Dispute - and same comment for Jones/Bixler:

Pilgrim Watch denies that it is state of the art; and asserts that there are better models to look to in order to obtain worthwhile results. David Chanin, the individual responsible for the MACCS2 code, created a MACCS2 Support Forum. Excerpts from the MACCS2 Support Forum, January 23, 2007 MACCS2 Economic Parameters, explain the reasons Pilgrim Watch's denies that MACCS2 code is "state of the art" and that SAND96-0957 provides an alternative and improved model to modify for this purpose.

"Speaking as the sole individual who was reponsible [sic] for writing the FORTRAN in question, which was done many years prior to my original work in SAND96-0957, I think it's foolish to think that any useful cost etimates [sic] can be obtained with the cost model built into MACCS2."

"It's not even worth discussing further. The economic cost numbers produced by MACCS2 have absolutely no basis."

“If you want to discuss economic costs, I’d be glad to discuss SAND96-0957, but the “cost model” of MACCS2 is not worth anyone’s time. My sincere advice is to not waste anyone’s time (and money) in trying to make any sense of it.”

“If you have a genuine interest in the economic consequences of radiological releases, my advice to you (as the first author of SAND96-0957 and collector of 300+ sources listed in its Bibliography) is to just please forget about the “cost model” of MACCS2.” [Chanin Decl.]

19. (NEB) *The sensitivity case to which material fact number 50 refers added one year’s gross county product per person (GCP/person) to the value of the land. This does not fully account for business losses. During periods of decontamination and interdiction, the costs accounted for in the model are the cost of decontamination, the cost to temporarily relocate people from the land, and costs associated with depreciation of improvements to the property and loss of use of the land and improvements. Loss of use is based on an expected rate of return and on the value of the property. For this SAMA analysis, the expected rate of return is 12% and the depreciation rate is 20%. What this means is that only a fraction of the actual GCP/person (less than 28% in the first year) is accounted for in the costs assigned during decontamination and interdiction. Furthermore, only one year’s GCP/person is accounted for in areas where the property is condemned even though the income associated with the land is lost permanently. Thus, this sensitivity case does not fully address the issue of loss of income. But the MACCS2 analyses show that most of the contaminated land is recovered and tourism would be calculated to return to the area. Because conservative costs were used for the regional value of non-farm wealth (VALWNF) and the sensitivity analysis results demonstrate that differences in the economic costs have minimal effects in the total cost, further adjustments to more precisely account for tourism would not be expected to change the conclusions of the SAMA.*

PW Response Bixler: A) The affidavit states that, “... the MACCS2 analyses show that most of the contaminated land is recovered and tourism would be calculated to return to

*the area.*” Again this demonstrates that Entergy and NRC Staff are apparently defining a “severe accident” as not that severe if, “most of the contaminated land is recovered and tourism would return to the area.” Pilgrim Watch requests that Entergy and NRC Staff provide a detailed definition and description of the offsite consequences and duration of the “severe accident” that they have used in their analyses and rationale for that choice.

B) The affidavit states that, *“Because conservative costs were used for the regional value of non-farm wealth (VALWNF) and the sensitivity analysis results demonstrate that differences in the economic costs have minimal effects in the total cost, further adjustments to more precisely account for tourism would not be expected to change the conclusions of the SAMA.”* PW’s response is the same as that provided to Entergy’s Material Fact 50, reproduced for your convenience below.

PW Response – Dispute: A) Pilgrim Watch acknowledges that Enercon added a few items to the MACCS2 values for non-farm property [they ignored farm property]; but neglected to factor in many other important economic costs that would result from a severe accident. New GCP/person figure appears to be based on value of goods and services a business produces in a single year. There is no justification for basing an analysis on a single year. Also they neglect to include the real value of business beyond the value of its annual goods and services that includes the loss of its intangibles, e.g., good will, reputation, etc.

B) The most important problem is as follows: Once you have the figures that Enercon produced by adding the GCP to the MACCS2 base figure, the real question is what population % of the total 50 mile population estimate did Entergy take in making their cost/benefit analysis? We know they used the straight line Gaussian plume – wedge or “key hole” – model and it is not appropriate to use at Pilgrim. [Beyea, Eagan, Rothstein Decs] and divided the population into a spatial distribution. And we know that they assumed a “well-behaved” accident. We know that the standard argument is that they do not need to use “worst case” but clearly that does not mean that they can use “best case.” Worst case, after all, would be a core melt that cascaded into a spent fuel pool fire.

**Table: Population per Mile Multiplied By Applicant's Sensitivity Case I&2 Costs**

Sector Miles	Total Population	Pop x \$135,187.77/per person 1 <sup>st</sup> sensitivity	Pop x \$189,041/person 2 <sup>nd</sup> sensitivity
0-10	165236	\$22,337,886,364	\$31,236,378,676
10-20	619601	\$83,762,477,480	\$117,129,992,641
20-30	1659661	\$224,365,869,546	\$313,743,975,101
30-40	3197941	\$432,322,512,382	\$604,541,964,581
40-50	1847128	\$249,709,115,225	\$ 349,182,924,248
50 total	7489767	\$1,012,524,898,550	\$ 1,415,873,043,447

In contrast, the table below illustrates potential costs if a straight-line plume distribution is used. For illustration when looking at the table assume only a minimal, not moderately severe accident, so that only a portion of any 0-10 sector is assumed impacted. It is not hard to understand how using an inappropriate plume model and minimizing a severe accident can reduce projected costs.

**Table: Population per Geographic Sector Multiplied by Applicant's Sensitivity Case I&2 Costs**

Sector	Total Population 0-10 miles	Pop x \$135,187.77/per person 1 <sup>st</sup> sensitivity	Pop x \$189,041/person 2 <sup>nd</sup> sensitivity
N	0	0	0
NNE	3	\$405,563.31	\$567,123.00
NE	3	\$405,563.31	\$567,123.00
ENE	3	\$405,563	\$567,123
E	5	\$675,939	\$945,2050
ESE	23	\$3,109,319	\$4,347,943
SE	950	\$128,428,381	\$179,588,950
SSE	13289	\$17,883,854,906	\$2,512,165,849
S	23695	\$3,203,274,210	\$4,479,326,495
SSW	23695	\$3,203,274,210	\$4,479,326,495
SW	23695	\$3,203,274,210	\$4,479,326,495
WSW	23695	\$3,203,274,210	\$4,479,326,495
W	22818	\$3,084,714,536	\$4,313,537,538
WNW	19494	\$2,635,350,388	\$3,685,165,254
NW	11269	\$1,523,430,980	\$2,130,303,029
NNW	5599	\$756,916,324	\$1,058,440,559

In the above table, imagine if Entergy assumes a severe accident is really one with small off-site release. For example if their straight line plume model predicts winds blowing to the NNE, perhaps one person will be affected costing at most \$189,041 in damages; or if the winds are blowing SW and only ½ the population within 0-5 miles is assumed affected (for illustration assume 6,000 people, population estimates not provided) then \$1,134,246,000 are the projected damages.

Summary: In contrast if a variable trajectory plume distribution model is used, winds shifting carrying the plume over many geographic areas; and a “severe accident” is assumed to be more than a small offsite release, then more SAMAs are likely to come into play – as the table below illustrates.

**Summary Comparison- Population Multiplied by Sensitivity Case**

<b>Population within area</b>	<b>1<sup>st</sup> sensitivity \$135,187.77/person</b>	<b>2<sup>nd</sup> sensitivity- \$189,041/person</b>
Population SE Sector, 950 (0-10 miles)	\$128,428,382 > 128 Million	\$179,588,950
Population SSW Sector, 23695 (0-10 miles)	\$3,203,274,210 > 3 Billion	\$4,479,326,495 >4 billion
Population within 10 miles, 165236	\$22,337,886,364 > 22 Billion	\$31,236,378,676 >31 Billion
Population within 20 miles 619601	\$83,762,477,480 > 83 Billion	\$117,129,992,641 >117 Billion
Population within 50 miles	\$1,012,524,898,550 (1 Trillion +)	\$ 1,415,873,043,447 > 1 Trillion
<b>Previous Projections</b>		
Core Melt, Pilgrim (1982) CRAC-2, Sandia National Laboratory, 1982 <sup>4</sup>	\$81.8 Billion	
Release C-137 from Core - Beyea	\$105-488 Billion [MA AGO, Dr. Beyea] [ based upon Massachusetts Attorney General's Office Analysis, Dr. Jan Beyea <sup>5</sup> ]	

<sup>4</sup> Calculation of Reactor Accident Consequences U.S. Nuclear Power Plants (CRAC-2), Sandia National Laboratory, 1982

In reviewing the above table, it is sobering to look at the impact of the Chernobyl accident, 1986, to help understand the potential impact from an accident as Pilgrim. Sheep remain contaminated in Wales<sup>6</sup> and reindeer are still contaminated in Lapland from an accident 20 years ago. Chernobyl was bad, no doubt, but certainly not worst case. The 1986 Chernobyl accident released 2,403,000 curies of C-137; whereas Pilgrim's core during license extension will have 5,130,000 curies of C-137. [Beyea Decl, Chernobyl release figure; License Application, Pilgrim CS-137 figure].

C. Impact new cancer risks: new studies should change threshold for adoption SAMA.

Dr. Jan Beyea stated in his attached declaration accompanying a consequence analysis for the Massachusetts Attorney General,<sup>7</sup> at 14, that,

“The current Environmental Report for Pilgrim assigns a value of \$2000 per person rem in deciding if a proposed SAMA is cost effective. According to results of [more recent studies] \$2000 per rem implies a valuation of \$200,000 per cancer death before discounting is way too low. \$50,000 net present value for a cancer death occurring 20 years from now, based on the 7% per year discount rate assumed in the Pilgrim Environmental Report, which leads to a factor of 4 reduction in present value for a cancer induced 20 years from now. [Beyea, at 14].

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<sup>5</sup> The Massachusetts Attorney General's Request for a Hearing and Petition for Leave to Intervene With respect to Entergy Nuclear Operations Inc.'s Application for Renewal of the Pilgrim Nuclear Power Plants Operating License and Petition for Backfit Order Requiring New Design features to Protect Against Spent Fuel Pool Accidents, Docket No. 50-293, May 26, 2006 includes a Report to The Massachusetts Attorney General On The Potential Consequences Of A Spent Fuel Pool Fire At The Pilgrim Or Vermont Yankee Nuclear Plant, Jan Beyea, PhD., May 25, 2006.

<sup>6</sup> Sheep farmers still suffer fallout from Chernobyl, Claire Hill, The Western Mail, May 26, 2003; Nuclear fallout that haunts Welsh farmers, Catriana Davies, Telegraph, April 2, 2006.

<sup>7</sup> The Massachusetts Attorney General's Request for a Hearing and Petition for Leave to Intervene With respect to Entergy Nuclear Operations Inc.'s Application for Renewal of the Pilgrim Nuclear Power Plants Operating License and Petition for Backfit Order Requiring New Design features to Protect Against Spent Fuel Pool Accidents, Docket No. 50-293, May 26, 2006 includes a Report to The Massachusetts Attorney General On The Potential Consequences Of A Spent Fuel Pool Fire At The Pilgrim Or Vermont Yankee Nuclear Plant, Jan Beyea, PhD., May 25, 2006.

As a result the SAMA analyses needs be redone ...Presumably; a number of additional SAMAs that were previously rejected by the applicant's methodology will now become cost effective. [Beyea at 14]. Increase in low doses from new research is dramatic – 5 fold increase over risk estimated in BEIR VII- based on information from Little 1998 it appears to represent a factor of 10 over the standard value use in the MACCS2 code the applicants analyses are based.” [Beyea Decl at 5]

*20. None of the differences cited above would have an effect that would change the conclusions of the SAMA analysis provided for the Pilgrim license renewal application. Further, the issues related to Contention 3 are bounded by the sensitivity analyses or have been addressed with factual responses in Entergy's Motion.*

PW Response Jones/Bixler– Dispute: A) Jones/Bixler conclude that,

*“None of the differences cited above would have an effect that would change the conclusions of the SAMA analysis provided for the Pilgrim license renewal application.”* They reach this conclusion because they too ignore the fundamental issues in dispute. Inappropriate models are used; input data is either underestimated or ignored; and therefore it is no surprise that they conclude consequences do not justify expenditures for bringing SAMAs into play. In other words they fail to step out of the box and look at what the effect on consequence, for example, would be using a variable trajectory model – which after all is the appropriate model to use in analyzing consequence in a coastal community. B) Jones/Bixler state further that, *“... the issues related to Contention 3 are bounded by the sensitivity analyses or have been addressed with factual responses in Entergy's Motion.* In reply PW refers back to our analysis provided in Pilgrim Watch's Response to Entergy's Motion for Summary Disposition.

## CONCLUSION

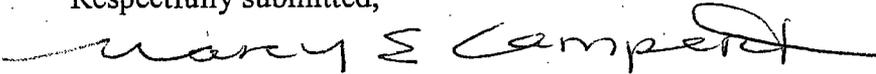
Pilgrim Watch discussed the core areas of dispute regarding meteorology, evacuation delay and time estimates and economic consequences in our response to Entergy's Motion for Summary Disposition at 50-91. Entergy, NRC Staff and the affidavit failed to respond to these core issues; and neither analyzed what their improperly limited approach admits to be issues for consideration. Both Entergy and NRC Staff failed to establish that a genuine issue of material dispute has ceased to exist.

Since the burden of proof is on the proponent of the motion, the evidence submitted must be construed in favor of the party in opposition thereto, who receives the benefit of any favorable inferences that can be drawn. *Sequoyah Fuels Corp. and General Atomics (Gore, Oklahoma Site Decontamination and Decommissioning Funding)*, LBP-94-17, 39 NRC 359, 361 (1994).

Pilgrim Watch has responded to NRC Staff's Motion and because the issues that they brought forward were identical or similar in nearly all respects to Entergy's motion, we bring to this response all expert, factual, and documented affirmation of the issues brought forward in our response to Entergy Motion.

If there is any possibility that a litigable issue of fact exists or any doubt as to whether the parties should have been permitted or required to proceed further, the motion for summary disposition must be denied. *General Electric Co. (GE Morris Operation Spent Fuel Storage Facility)*, LBP-82-14, 15 NRC 530, 532 (1982); *Safety Light Corn. (Bloomsburg Site Decommissioning and License Renewal Denials)*, LBP-95-9, 41 NRC 412449 n.167) citing *Anderson v. Liberty Lobby, Inc.*, 477 US. 242, 248 (1986).

Respectfully submitted,

  
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July 9, 2007

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of Docket # 50-293

Entergy Corporation

Pilgrim Nuclear Power Station

License Renewal Application

July 9, 2007

**CERTIFICATE OF SERVICE**

I hereby certify that the foregoing Pilgrim Watch Answer To NRC Staff Response To Entergy's Motion For Summary Disposition of Pilgrim Watch Contention 3 has been served this 9th day of July, 2007 by electronic mail and by U.S. Mail, first class to each of the following:

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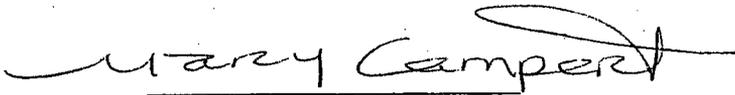
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